

CLAIMS

1. A recombinant polynucleotide comprising a first nucleic acid sequence encoding a humanized *Renilla reniformis* green fluorescent protein (hrGFP) and a second heterologous nucleic acid sequence inserted internally into said first nucleic acid
5 sequence encoding humanized hrGFP, said recombinant polynucleotide encoding a scaffold GFP.
2. The recombinant polynucleotide of claim 1 wherein said scaffold GFP is fluorescent.
3. The recombinant polynucleotide of claim 1 wherein the said first nucleic acid
10 sequence encoding a hrGFP is SEQ ID NO: 1.
4. The recombinant polynucleotide of claim 2 wherein said second heterologous nucleic acid sequence is inserted between nucleotides 519 and 520 of said first nucleic acid sequence encoding hrGFP.
5. The recombinant polynucleotide of claim 1 wherein said second heterologous
15 nucleic acid sequence comprises a multiple cloning site sequence.
6. The recombinant polynucleotide of claim 1 wherein said second heterologous nucleic acid sequence is the multiple cloning site sequence of SEQ ID NO: 2.
7. The recombinant polynucleotide of claim 4 or 5 further comprising a third nucleic acid sequence inserted internally into said multiple cloning site, wherein said third
20 nucleic acid sequence comprises a random nucleic acid sequence.
8. The recombinant polynucleotide of claim 6 wherein said third nucleic acid sequence encodes a peptide in frame with said hrGFP coding sequences.
9. The recombinant polynucleotide of Claim 6 wherein said third nucleic acid sequence encodes a peptide of 2 to 50 amino acids.

10. The recombinant polynucleotide of claim 6 wherein said third nucleic acid sequence encodes a polypeptide of 10 to 20 amino acids.

11. A recombinant polypeptide comprising *Renilla reniformis* green fluorescent protein (GFP) and a heterologous peptide that is fused internally into said GFP.

5 12. The recombinant polypeptide of claim 7 wherein said heterologous peptide is located between amino acid residues 173 and 174 of said GFP.

13. The recombinant polypeptide of claim 7 wherein said second heterologous amino acid sequence is a random peptide sequence.

10 14. A recombinant vector comprising the recombinant polynucleotide sequence of any of claims 1-6.

15. The recombinant vector of claim 11 wherein said vector is selected from the group consisting of a plasmid, a bacteriophage, a virus, and a retrovirus.

16. A cell comprising the recombinant vector of claim 11.

15 17. A library of recombinant vectors comprising a plurality of recombinant polynucleotides wherein said recombinant polynucleotides comprise a first nucleic acid sequence encoding humanized *Renilla reniformis* green fluorescent protein (hrGFP) and a second heterologous nucleic acid sequence inserted internally into said first nucleic acid sequence encoding hrGFP, wherein the members of the library comprise a plurality of different said second heterologous nucleic acid sequences.

20 18. The library of claim 17 wherein said plurality of different said second heterologous nucleic acid sequences comprise a plurality of randomized nucleic acid sequences.

19. A method for identifying a peptide conferring a phenotype of interest comprising the steps of:

- a) providing a plurality of cells, each cell containing a recombinant vector comprising a recombinant polynucleotide that encodes a recombinant polypeptide comprising *Renilla reniformis* green fluorescent protein (hrGFP) and a heterologous random peptide wherein said heterologous random peptide is fused internally into said hrGFP, under conditions wherein said recombinant polypeptide is expressed; and
- b) assaying said cells for said phenotype.

20. A method for identifying a peptide that interacts with a protein of interest, the method comprising the steps of:

- 10 a) introducing a library of recombinant vectors comprising recombinant polynucleotides that encode recombinant polypeptides into a plurality of host cells and maintaining said cells under conditions wherein said recombinant polypeptides are expressed,
- 15 wherein said recombinant polypeptides comprise *Renilla reniformis* green fluorescent protein (hrGFP) fused to a transactivation domain and a heterologous randomized peptide fused internally into said hrGFP and,
- 20 wherein said host cells contain a gene that encodes a protein of interest fused to a DNA binding domain, and a reporter gene functionally linked to a DNA sequence that binds said DNA binding domain, wherein expression of said reporter gene is regulated by said transactivation domain and;
- b) detecting expression of said reporter gene, wherein detection of reporter gene expression identifies said heterologous random peptide as a peptide that interacts with the protein of interest.